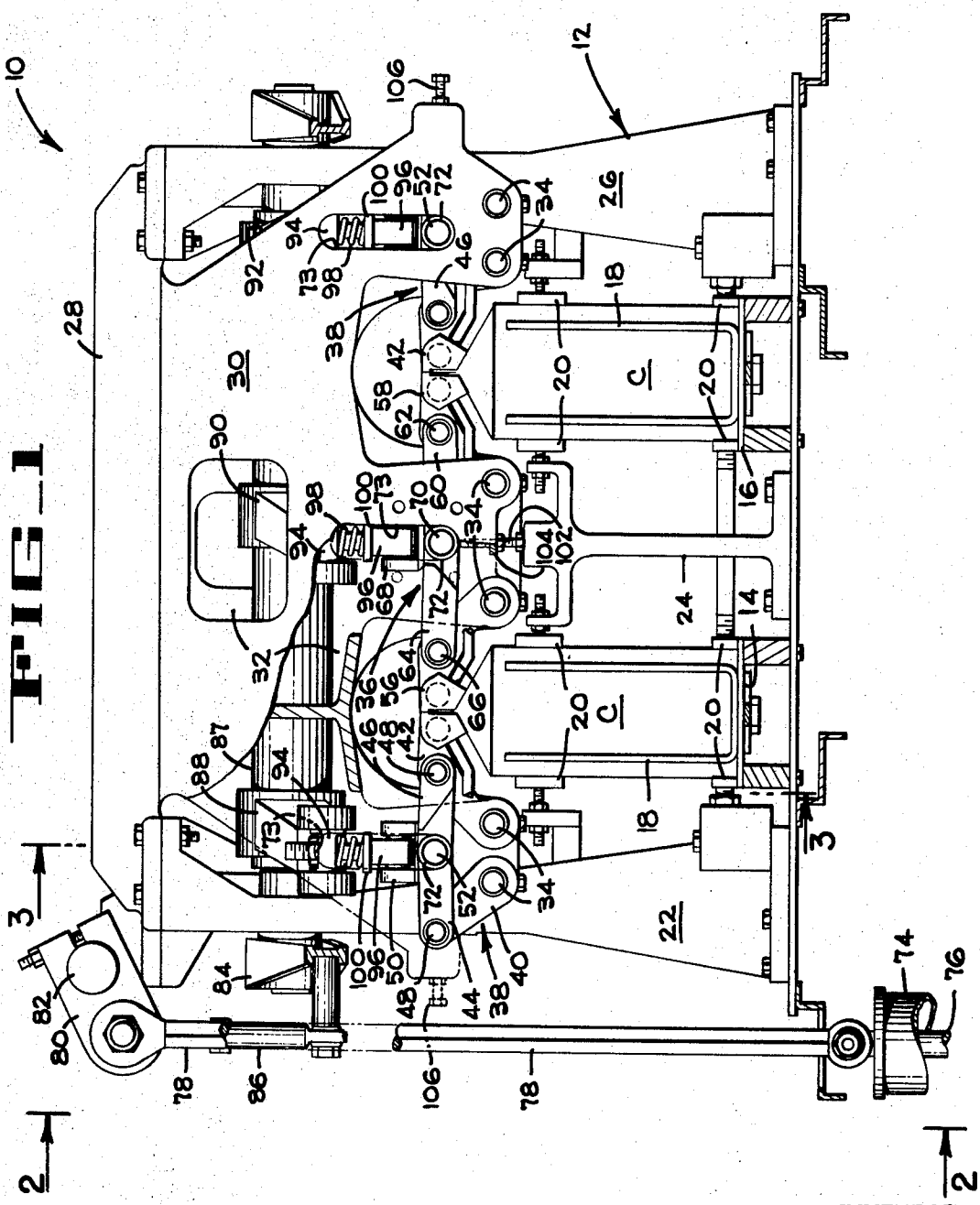
Oct. 27, 1970 R. K. GELLATLY ET AL 3,535,848

CARTON SEALING APPARATUS

Filed Oct. 17, 1968 4 Sheets-Sheet 1

FIG. 1



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CARTON SEALING APPARATUS

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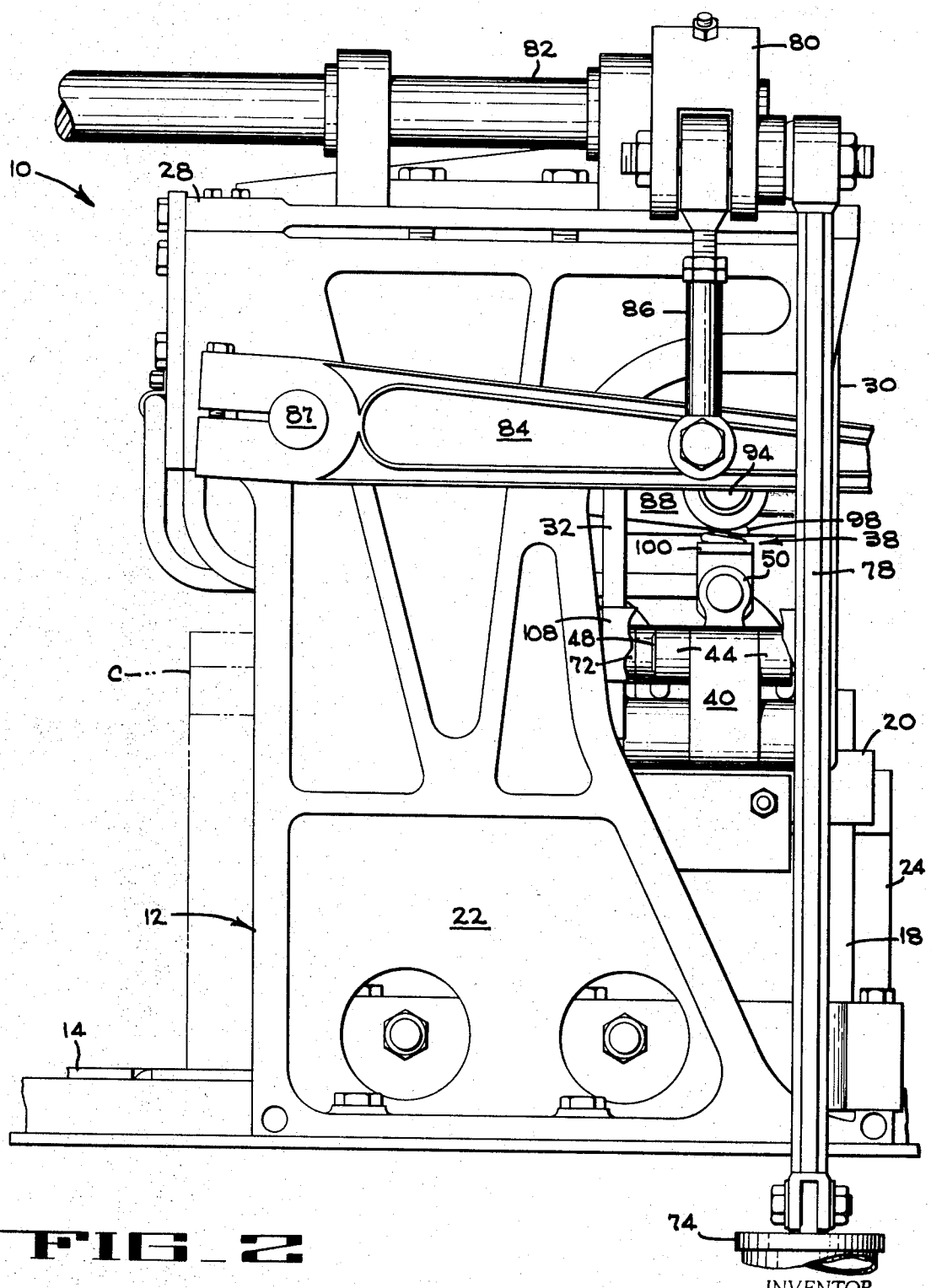


FIG_2

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CARTON SEALING APPARATUS

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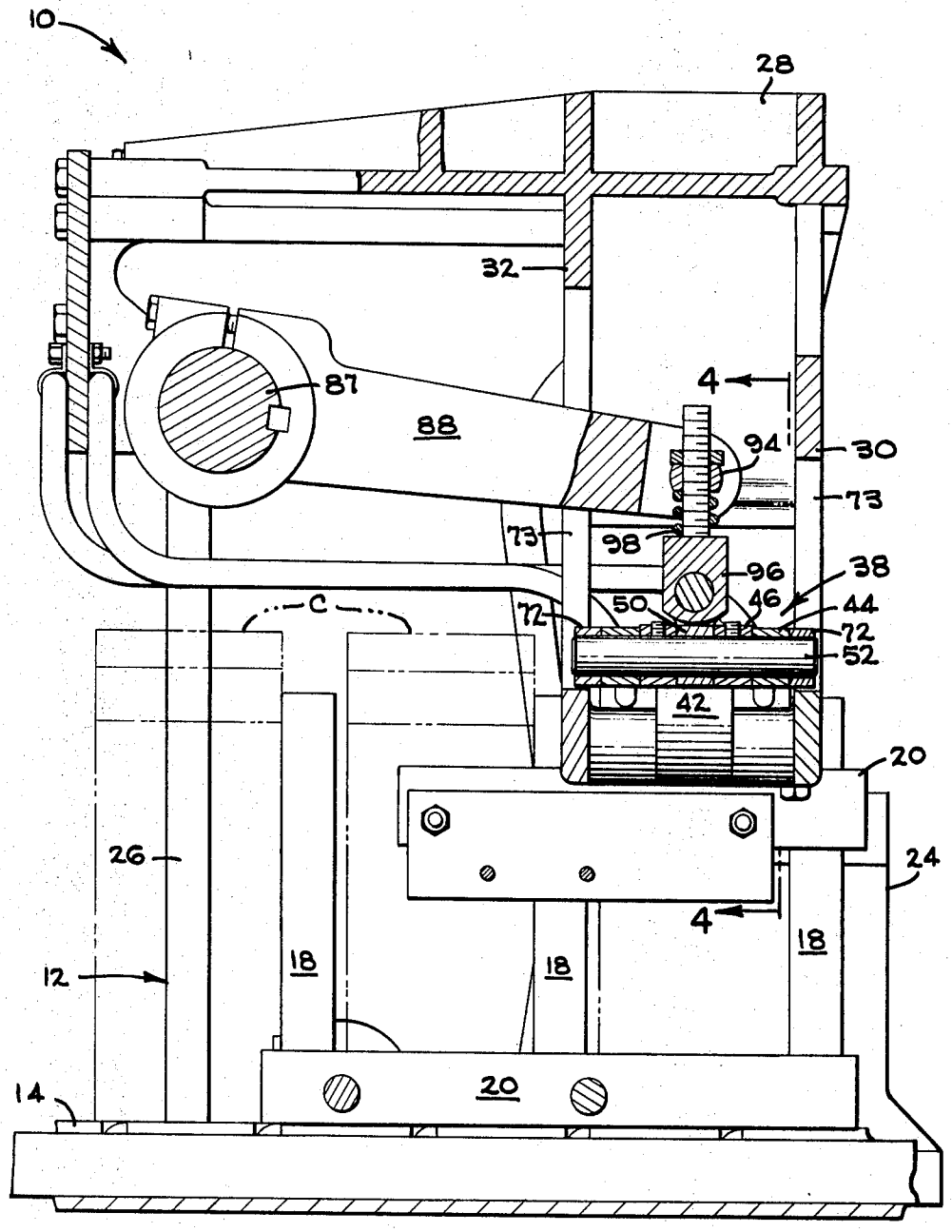


FIG_3

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CARTON SEALING APPARATUS

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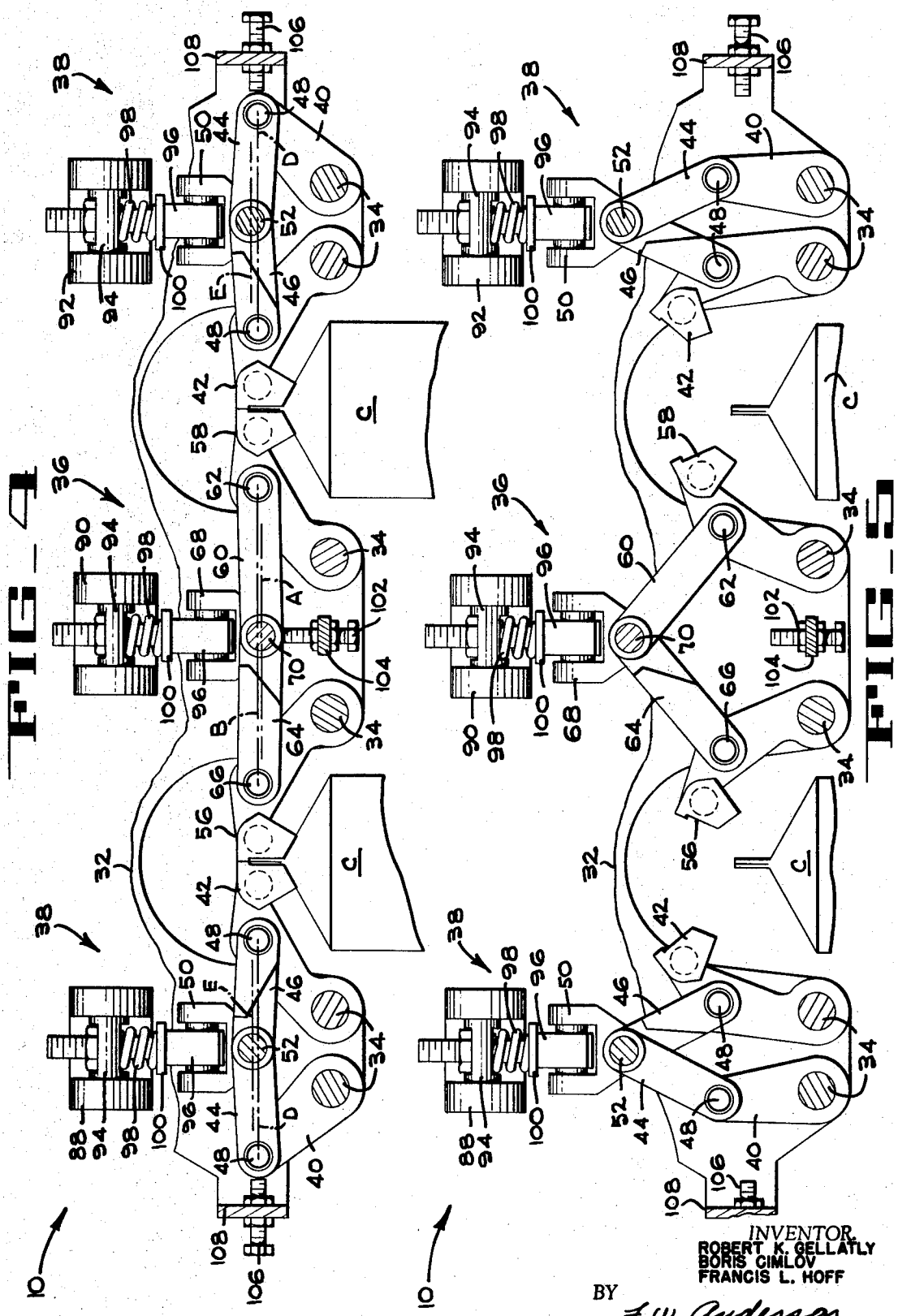


FIG. 4

FIG. 5

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CARTON SEALING APPARATUS

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Int. Cl. B65b 51/10
U.S. Cl. 53—373 12 Claims

ABSTRACT OF THE DISCLOSURE

Apparatus for applying sealing pressure to a plurality of rows of cartons by cooperating toggle linkages connected to pivotal pressure applying sealing heads. One of the toggle linkages associated with each carton is moved to an overcenter locking position when in its sealing position, and the other toggle linkage is arranged to terminate its movement into sealed position prior to reaching said overcenter position. Resilient means are disposed in the actuating linkages to said toggle linkages thereby providing means for accommodating cartons having sealing flaps of different thicknesses.

Cross reference to related patents

The carton sealing apparatus of the present invention is associated with the type of carton forming and filling machine disclosed in U.S. Pat. No. 3,248,841 which issued to Heffelfinger et al. on May 3, 1966 except that the machine is adapted to handle gable top cartons of the type disclosed in U.S. Pat. No. 3,207,049 which issued to Monroe et al. on Sept. 21, 1965.

Background of the invention

Cartons which have a thermoplastic coating on their inside and outside surfaces are first heated to render the thermoplastic coating tacky, and the sealing surfaces are then forced together by pressure of about 850 p.s.i. for about two seconds by means of opposed sealing heads. In order to permit free entry of the top closure of the carton between the sealing heads, it is desirable that both heads be displaced from the sealing position as the carton is indexed therebetween, and that the heads thereafter be moved into clamping engagement with the top closure. Since both sealing heads are movable between a retracted position and a sealing position, it has been discovered that it is difficult to prevent one head from overpowering the other head and thereby permitting slight displacement of the sealing surfaces of the top closure during the sealing operation.

Summary of the invention

In accordance with the present invention it has been determined that by connecting the toggle linkages to the sealing heads in such a way that, while in the sealing position, one of the heads is moved to an overcenter locking position while the other head terminates its movement prior to reaching the overcenter locking position of its associated toggle linkage; that overpowering of one head by the other is prevented, that the carton will not shift during sealing thus providing an inferior seal, and that the power required to apply the sealing pressure is reduced to a minimum.

Brief description of the drawings

FIG. 1 is a front elevation of the carton sealing apparatus of the present invention with parts broken away illustrating two rows of cartons with the toggle linkages and sealing heads associated with each row being disposed in sealing position.

FIG. 2 is an enlarged side elevation looking in the direction of arrows 2—2 of FIG. 1 illustrating the general shape of the apparatus and further illustrating the power means and certain linkages for operating the sealing heads.

FIG. 3 is an enlarged section taken along lines 3—3 of FIG. 1 illustrating the toggle linkages in a retracted position.

FIG. 4 is an enlarged vertical section taken along lines 4—4 of FIG. 3 illustrating the central toggle linkage in sealing position with the central linkages moved to an overcenter lock position and further illustrating the outer linkages in their sealing positions short of their overcenter locking position.

FIG. 5 is a vertical section similar to FIG. 4 but illustrates the sealing heads in an open position.

Description of the preferred embodiment

The carton sealing apparatus **10** (FIGS. 1 and 2) of the present invention is mounted on a frame **12** supporting a pair of intermittently driven conveyors **14** and **16**. The conveyors include a series of upstanding pushers **18** having cartons C disposed therebetween. The top closure of each carton is of the well known gable type which includes two vertical sealing surfaces. The cartons are guided along their paths of movement by guide tracks **20** which are adjustably supported by vertical pedestals **22**, **24** and **26** of the frame **12**.

The frame **12** also includes an arch on beam **28** which is bolted to the upper end of pedestals **22** and **26** above the path of movement of the cartons. The arch **28** includes a forward wall **30** and rear wall **32** which are suitably bushed to provide pivotal support for pivot pins **34** of a central sealing head assembly **36** and two side sealing head assemblies **38** of similar construction.

As best illustrated in FIGS. 4 and 5, each side sealing assembly **38** includes a lever arm **40** and a sealing head **42** connected at their lower ends to adjacent pivot pins **34**. A wide link **44** and a narrow link **46** are connected by pivot pins **48** to upper portions of the lever arm **40** and sealing head **42**. The wide link **44** and narrow link **46** are connected together and to a yoke **50** by a central pivot pin **52** thereby defining a side toggle linkage.

The central sealing head assembly **36** is quite similar to the side sealing head assemblies **38**. The central assembly **36** includes two sealing heads **56** and **58** connected at their lower ends to adjacent pivot pins **34**. A wide link **60** is connected to the head **58** by a pivot pin **62**, and a narrow link **64** is connected to the head **56** by a pivot pin **66**. The two links **60** and **64** are connected together and to a yoke **68** by a pivot pin **70** to define a central toggle linkage. As illustrated in FIGS. 1 and 3, the pivot pins **52** and **70** have collars **72** on their ends which project through and are guided during vertical movement by slots **73** in the forward and rear walls of the arch **28**.

The toggle linkages are moved vertically between the positions illustrated in FIGS. 4 and 5 by hydraulic power unit **74** (FIGS. 1 and 2) which is actuated in timed relation with the movement of the conveyors **14** and **16** so as to raise and lower its piston rod **76** and a connecting link **78** when the conveyors have indexed cartons in two sealing stations. The upper end of the link **78** is pivotally connected to a lever **80** which is keyed to a pivot shaft **82** journaled on the frame **12**. The lever is also pivotally connected to a second lever **84** by link **86** having a self-aligning connector on its lower end. The lever **84** is keyed to a cross shaft **87** journaled in the frame **12** and having three toggle linkage actuating levers **88**, **90** and **92** keyed thereto. The free ends of each linkage actuating lever is forked and has a pivot pin **94** (FIGS. 3 and 4) journaled therein. Each pivot pin **94** is apertured to receive the threaded upper end of a link **96** which is pivotally con-

nected to the associated yoke **50** or **68**. A spring **98** or, if desired a plurality of resilient frusto-conical spring plates, are disposed between a flat cut in the associated pin **94** and a collar **100** formed on the associated link **94** thereby providing a resilient connection between the pins **94** and the associated toggle linkages.

As illustrated in FIGS. 1, 4 and 5, a stop bolt **102** is locked to a web **104** of the frame **12** in position to positively limit downward movement of the central toggle linkage to a position slightly past the overcenter lock position of the linkage. Similarly, the stop bolts **106** are locked to webs **108** outwardly of the associated side toggle linkages in position to engage the associated wide link **44** when a carton is not in position to be sealed, and terminates movement of the toggle linkage **50** before the associated pin **52** moves past the overcenter lock position. The stop bolts **106** also prevent the sealing surfaces of adjacent sealing heads from contacting each other when a carton is not in sealing position.

In operation of the carton sealing apparatus **10** of the present invention, cartons C having the thermoplastic coating of their top closures heated to a bonding temperature are intermittently advanced by the conveyors **14** and **16** at about three second intervals into positions to be sealed. The power unit **74** is then actuated causing the free ends of the toggle linkage actuating levers **88**, **90** and **92** to pivot downwardly to the position shown in FIG. 4 thereby causing the axis of the central pin **70** of the central toggle linkage to move downwardly to a plane A beyond the overcenter locking position, which position is defined by a horizontal plane B containing the pivot axes of the pins **62** and **66**. The central toggle linkage is locked in the overcenter position by the stop bolt **102**.

Downward movement of the side toggle linkage levers **88** and **92** cause the axes of the central pins **52** of the side toggle linkages to move downwardly to a position E above the overcenter locking position of the associated side toggle linkages, which overcenter locking position is defined by a plane D containing the axes of associated pins **48**.

The connecting link **96** associated with the central toggle linkage is adjusted so that the central toggle linkage moves to its adjusted position slightly before the side toggle linkages move to their closing positions. In this way the central sealing head assembly **36** is locked in sealing position prior to the exertion of forces thereagainst by the side sealing assemblies **38** which would tend to overpower the central assembly. When cartons are in position to be sealed, the stop bolts **106** associated with the side sealing assemblies are ineffective and remain spaced from the assemblies. Downward pivotal movement of the toggle linkage levers **88**, **90** and **92** continue until the desired sealing pressure is obtained, and differences in wall thicknesses of the top closure flaps of the cartons being sealed is accommodated by the springs **98**. The total sealing pressure applied by the hydraulic power unit **74** may be adjusted to a predetermined pressure by means of a pressure regulator in the hydraulic system in a manner well known in the art.

In the specification and claims, it will be understood that the term "buckled position" of the toggle linkage means that the linkage is position as illustrated in FIG. 5; the term "straight line position" means that the three pivot axes of the toggle linkage lie in a common plane; and the term "overcenter lock position" means that the center pivot point of the toggle linkage has moved slightly beyond the above mentioned common plane as illustrated by the position of the central linkage in FIG. 4.

From the foregoing description it is apparent that the carton sealing apparatus includes at least two opposed sealing heads controlled by separate toggle linkages. In order to prevent overpowering of one of the sealing heads, one of the toggle linkages is moved to the overcenter locking position and the other toggle linkage is arranged so that its movement is terminated prior to reaching the overcenter locking position. Resilient means are also provided in the actuating means for the toggle linkages so as to accommodate cartons having top closures of different wall thicknesses.

Although the best mode contemplated for carrying out the present invention has been herein shown and described, it will be apparent that modification and variation may be made without departing from what is regarded to be the subject matter of the invention as set forth in the appended claims.

Having completed a detailed description of the invention so that those skilled in the art could practice the same, we claim:

1. A carton sealing apparatus for applying sealing pressure to the flaps of a carton to be sealed comprising means for supporting a carton at a sealing station, a pivotally mounted central sealing head having a sealing surface movable between a retracted position and a sealing position with said sealing surface engaging one side of the flaps of a carton to be sealed, a pivotally mounted side sealing head having a second sealing surface movable between a retracted position and a position wherein the second sealing surface engages the other side of the flaps to be sealed, a central toggle linkage pivotally connected to said central sealing head and movable between a buckled position and a substantially straight line position to move said central head between said retracted and said sealing position, a side toggle linkage pivotally connected to said side sealing head and movable between a buckled position and a substantially straight line position to move said side head between said retracted and said sealing positions, and means for actuating said toggle linkages.

2. An apparatus according to claim **1** wherein said central toggle linkage is moved past said straight line position into an overcenter lock position when said central sealing head is in sealing position.

3. An apparatus according to claim **2** wherein movement of the side toggle linkage into sealing position is terminated prior to the linkage reaching the straight line position.

4. An apparatus according to claim **3** wherein resilient means are connected between said actuating means and each of said toggle linkages so as to accommodate cartons having flaps which vary in thickness.

5. An apparatus according to claim **3** wherein said actuating means includes means for moving said central sealing head into sealing position prior to the movement of said side sealing head into sealing position.

6. An apparatus according to claim **2** wherein adjustable stop means are provided to terminate movement of said central toggle linkage in said overcenter locking position when said central sealing head is in its sealing position.

7. An apparatus according to claim **3** wherein adjustable stop means are provided to terminate movement of said side toggle linkage prior to reaching the straight line position.

8. An apparatus according to claim **3** wherein said supporting means is an intermittently driven conveyor.

9. A carton sealing apparatus for simultaneously applying sealing pressure to the flaps of two cartons, comprising a pair of spaced conveyors for supporting cartons and simultaneously moving two cartons into sealing stations, a pair of pivotally mounted central sealing heads having sealing surfaces movable into position to engage one side of the flaps of the two cartons being sealed, a pair of pivotally mounted side sealing heads each having a sealing surface movable into a position to engage the other sides of the flaps of the two cartons being sealed, a central toggle linkage pivotally connected to said central sealing heads and movable between a buckled position spacing said central heads from said flaps and sealing positions immediately adjacent a straight line toggle position urging the central heads against said side surfaces of

the flaps of the two cartons, a pair of side toggle linkages with one linkage being connected to one of said side sealing heads and the other linkage being connected to the other side sealing head, each side toggle linkage being movable between a buckled position spacing said side head from the associated flaps to a sealing position immediately adjacent a straight line toggle position, and means for actuating said toggle linkages.

10. An apparatus according to claim **9** wherein said central toggle linkage is moved past said straight line position into an overcenter locking position when said central sealing heads are in sealing positions.

11. An apparatus according to claim **10** wherein movement of each side toggle linkage into sealing position is terminated prior to the side linkages reaching their straight line toggle positions.

12. An apparatus according to claim **10** wherein resilient means are connected between said actuating means and each of said toggle linkages so as to accommodate cartons having flaps which vary in thickness.

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TRAVIS S. McGEHEE, Primary Examiner

U.S. Cl. X.R.

53—375